ABSTRACT

The artificial olfactory system is an ultra-sensitive and selective odor sensing system for the detection of odorant molecules down to the part per trillion level. The system includes multiple ultra sensitive frequency sensors, such as sensors based on piezoelectric substrates or micro-machined resonators, capable of detecting frequency changes resulting from the interaction of odorant molecules with the sensor. A coating applied to the sensor greatly increases the surface of interaction between the odorant molecules or biological agents and the sensor. An array of these sensors, each responding to the interaction of an odorant molecule species but in a different manner, results in different frequency shifts. An ultra sensitive frequency measurement device measures as small as part per billion shift in frequency. An intelligent processor based on artificial neural networks and other intelligent signal processing system detects, recognizes, and generalizes the signature resulting from the collective response of all the sensors.